



**DEFENSE SECRETARY Robert S. McNamara and MSC Director Robert R. Gilruth hurry toward the Farnsworth-Chambers control room Thursday evening where McNamara and a group of defense officials were given a briefing on the Gemini program. McNamara arrived in Houston Thursday night for about three hours after being delayed almost 24 hours by bad flying weather.**

## Secretary of Defense Gets Three-Hour Gemini Briefing

Secretary of Defense Robert S. McNamara arrived in Houston Thursday night after a 24-hour weather delay to receive a briefing on Project Gemini from MSC officials.

Landing shortly before 6 p.m., the secretary and his group of high-ranking officials went immediately to the Farnsworth Chambers control room for the briefing, while Assistant Secretary of Defense for Public Affairs Arthur Sylvester read a prepared statement to the press.

"My visit to the NASA Manned Spacecraft Center is to learn more about the Gemini program at first hand," said McNamara's statement. "I come here from Seattle where I was given a complete

briefing on the progress of the X-20 (Dyna-Soar) program at Boeing."

"In the last six months the Department of Defense has completed with NASA an agreement on joint planning for the NASA Gemini program. We want to see how Gemini and the X-20 can be fitted together to make the best program for both military and civilian purposes.

"The Gemini program provides for two men to be placed in orbit in 1964. The X-20 program proposes to place one man in orbit at a later date.

While the X-20 would be in orbit less time than proposed in the Gemini program it would provide more recoverable payload because it would

*(Continued on Page 7)*

## Bids On Control Center Building Well Within Reach

A San Francisco firm was apparent low bidder Friday on the actual structural work needed to finish the Integrated Mission Control Center at Clear Lake.

Ets-Hokin and Galvan, Inc. entered a bid of \$7,879,402 to complete the building on which the foundation and steel work are already going up, under a \$702,977 contract with W. S. Bellows and Peter Kiewit.

All of the four bidders on the contract were under the \$8.5 million Government estimate. Col. F. P. Koish, of the Ft. Worth District, U. S. Army Engineers, said the contract will be awarded as soon as the paper work can be done. There are \$8.9 available in funds for the project.

Col. Koish said the two alter-

*(Continued on Page 7)*

## 165 MSC Employees Will Get Pay Raise Beginning Next Week

Some 165 MSC personnel in engineering and scientific categories will get a pleasant surprise next week when the paychecks come around.

Under last year's Federal Salary Reform Act, and Executive Order 11073, the Civil Service Commission has increased the minimum salary rates and rate ranges for professional engineers and certain

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## NASA, Grumman Sign \$387 Million Contract

The National Aeronautics and Space Administration has signed a \$387,900,000 contract with the Grumman Aircraft Engineering Corp. of Bethpage, New York to develop the lunar excursion module of the Apollo spacecraft.

The contract spells out the terms under which Grumman, on a cost-plus-fixed-fee basis, will design, fabricate and deliver nine LEM ground test vehicles and 11 LEM flight vehicles. The contract also covers operational support to be provided NASA by Grumman.

Selection of Grumman for contract negotiation to develop the LEM, a spacecraft designed to land American astronauts on the moon in this decade, was announced on November 7, 1962.

Contract negotiations were completed without issuing an interim or "letter" contract. Joseph G. Gavin, vice-president and LEM project director of Grumman, and R. O. Piland, deputy project manager for the LEM in the MSC Apollo Project Office, headed the negotiating teams.

*(Continued on page 2)*

## Faget Is Speaker At Science Fair; Awards Presented

Maxime A. Faget, assistant director for engineering and development, spoke Saturday at the Greater Houston Science Fair, which was sponsored by the Engineers Council of Houston and The Houston Post in cooperation with the Houston Independent School District.

The three-day event began Friday at the Sam Houston Coliseum. Junior and senior high school students from a 26-county area participated.

Research on a life support system for space flight and a project delving into the development of new resins for ion exchange won the top awards at the Fair. The 1963 grand award winners were Nelson Fleming, 15, of Beaumont, a sophomore biology student at Beaumont High School, and Paul Quinton, 18, of Baytown, a senior in chemistry at Robert E. Lee High School.

*(Continued on Page 2)*

## Glenn To Receive Goddard Trophy

Astronaut John H. Glenn Jr., the first U. S. astronaut to orbit the earth, has been named the recipient of the 1963 Robert H. Goddard trophy.

The highly-coveted award of the National Rocket Club is given annually at the Robert H. Goddard Memorial Dinner in commemoration of the "greatest achievement during the preceding year to advance

*(Continued on Page 7)*



**MAXIME A. FAGET, assistant director for engineering and development, spoke Saturday at the Houston Science Fair and congratulated the two winners of the 1963 grand awards, Nelson Fleming (left) of Beaumont High School and Paul Quinton (right) of Robert E. Lee High School in Baytown.**



**NORMAN F. SMITH**, special assistant to the chief, Spacecraft Technology Division, was one of a group of senior engineers who "sat in" on science classes in Houston high schools this month, the second phase of the MSC Curriculum Development Workshop. Here Smith discusses a science experiment with Linda Wilson (left) and Patsy Grimes at Johnston Junior High School.

## Grumman

(Continued from page 1)

Grumman and its sub-contractors will produce all major sub-systems of the LEM, except for the navigation and guidance systems, which will be developed for NASA by the Instrumentation Laboratory of the Massachusetts Institute of Technology and its industrial support contractors.

The LEM is one of three modules being developed for the Apollo spacecraft configuration. The other two, command module and service module, are being developed for NASA by North American Aviation, Inc., Downey, California.

When the LEM is detached from the Apollo Command and Service Module to descend to the surface of the moon it will weigh about 12 tons. The two-man cab will be ten feet in diameter. Mounted on five skid type legs, LEM will stand about 15 feet tall. The legs and descent engine will serve as a gantry and will remain on the lunar surface.

## Radiation Gets

### Data System Bid

Radiation Incorporated has announced the receipt of a \$382,000 contract from McDonnell Aircraft Corp. of St. Louis, Mo. for the design, development and testing of a digital data processing system for Project Gemini.

The highly advanced digital data processing and deconvolution system will be capable of processing pulse code modulation (PCM) signals derived from playback of magnetic tape recordings and/or the output of a telemetry receiver. The system will be divided into a digital section and an analog section. The digital equipment will be capable of converting PCM data to digital format on magnetic tape for input into a digital computer. The analog equipment will convert the same PCM data into analog form for graph charts and other visual displays.

## Exhibit

(Continued from page 8)

and objectives, career opportunities, and the like. A sound system will broadcast a taped explanation at this location.

The entire display utilizes such panels suspended from the ceiling, so that maximum use of the space will be possible without blocking or impeding the flow of traffic through the exhibit.

At one point, three clear plexiglas cubes suspended from the ceiling will contain various pieces of equipment, hardware and food packages will descriptive copy.

The Gemini area will contain graphic representation of the Gemini spacecraft and a series of back-lighted color transparencies which can later be replaced by a quarter-size model. Three "hearphone" speakers, on which visitors can listen to an automatic tape playback about the Gemini mission, will be included.

The Apollo display will be similar, with a quarter-size graphic representation of the spacecraft which can be replaced by a model for updating.

The launch vehicle exhibit will include scale models mounted on a table with a clover-leaf overhanging display of launch photography.

The entire exhibit will be illuminated with special lighting arrangements, such as hidden fluorescent fixtures to backlight the transparencies used. Some of the pictures will be unusual and interesting cloud patterns and weather formations.

The display will stress future programs rather than history.

An attendant will be on duty during daylight hours.

A chronology of flights displayed on one wall will be kept up to date as the flight program progresses.

## Lear Siegler Will Supply Fuel And Oxidizer Guages

A third Lear Siegler, Inc. instrument will be aboard NASA's two-man Gemini spacecraft, it was announced by J. M. Walsh, President of LSI's Instrument Division.

Under a contract with McDonnell Aircraft Corporation, prime contractor to NASA's Manned Spacecraft Center for Gemini, the Instrument Division will supply fuel and oxidizer indicators which will show the astronaut the fuel and oxidizer pressure of Gemini's launch vehicle.

Other indicators being designed and built by the Division for Gemini are a dual-installation three-axis flight director with controller and an incremental velocity indicator. All three instruments will appear on the vehicle's main instrument panel and, together, will constitute a vital part of the Gemini's central panel.

The Gemini panel will contain two fuel and oxidizer pressure indicators, one for the first stage booster and another for the second stage.

During the lift-off stage, the astronaut will use the first indicator to check the pressure of fuel and oxidizer in the propellant tanks of the first-stage engine. An incorrect tank pressure may indicate a potential malfunction of the launch vehicle. By keeping him informed of fuel and oxidizer pressures, the LSI indicator will give the astronaut time either to shut off the engine or to abort, should he believe the situation dangerous.

The second indicator will show the astronaut his fuel and oxidizer pressures of the second stage throughout the launch phase. This permits monitoring of lock-up pressure during first stage flight to insure adequate pressure for

staging, and operational tank pressures during second stage flight which aids the astronaut in detecting a malfunction in the launch vehicle.

The indicators feature vertical-scale read-outs and are floated in a special fluid to absorb the shock and vibration of blast-off. They are unique in that each read-out is fully redundant with two pointers, side by side, for each quantity displayed. This feature assures the high reliability required in the Gemini systems.

## Correale Gets \$50 Incentive Award

James Correale, chief of Crew Equipment Branch, Crew Systems Division, has received a \$50 incentive award under the Navy Awards Program for his invention of a universal helmet for military flyers, on which a patent is now pending.

The helmet can be used with a full pressure suit for high-altitude flying, with the exposure suit used by Navy pilots for low missions over water, and also for high altitude flying below the level requiring a pressure suit.

Its adaptability eliminates the need for stocking two or three different helmets for various types of missions.

With the grant of a patent on the invention, Correale will receive a further monetary award.

The average share account of the 12,838,888 credit union members in the U. S. is \$434.

## Faget Is Speaker

(Continued from page 1)

Fleming won his award for construction of a homemade life support system in which a pet hamster has been living for several months, completely cut off from the outside world. A green alga called Spirogyra was used to recycle the oxygen.

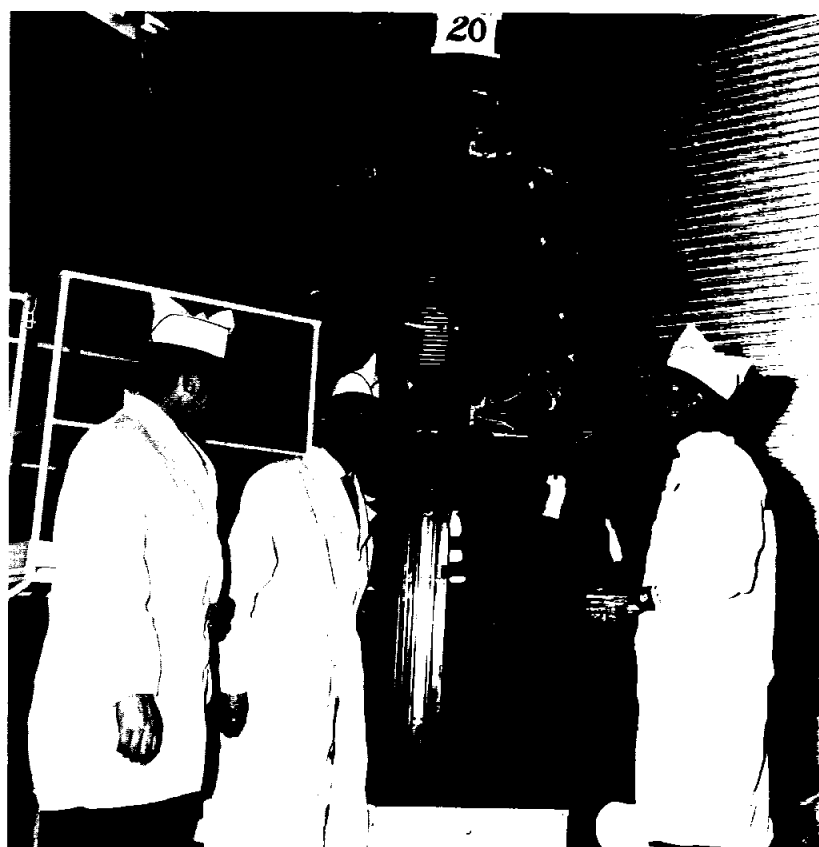
Quinton has spent more than a year working on an exhibit in which he filtered cobalt, nickel and iron through columns of resin in chemical research intended to point the way to the development of a new and better resin for ion exchange work.

Faget noted that young, science-minded students such

as those competing in the fair were now a natural resource.

"But the scientific strength and capabilities of a nation are not counted like its natural resources," he said. "It is not like the oil we have in the ground, or the farm areas, or the water resources, or the natural harbors, for these things are real and lasting. A nation's technological strength is a dynamic thing and exists to the extent that it is developed, exercised, and applied."

Fleming and Quinton will receive expense paid trips to the National Science Fair International in Albuquerque, N. M. in May.



**A FRENCH ASTRONOMER**, Professor Audidion Charles Dollfus of the Paris Observatory, (center) visited the Cape Canaveral "White Room" recently and was briefed on Astronaut L. Gordon Cooper's spacecraft, currently undergoing preflight tests. Here Paul C. Donnelly (left), chief test conductor, and John J. Williams, chief of test operations for Preflight Operations Division, explain the white room test procedures to Dollfus.

# MSC Studies Laser For Possible Space Applications

A beam of light capable of such high energy concentration that it can penetrate a steel plate in a fraction of a second is presently under evaluation by the Manned Spacecraft Center to determine whether it can be harnessed for space.

The device that produces the light is called LASER (after Light Amplification by Stimulated Emission of Radiation). Simple, ordinary white light at high intensity is "pumped" into an active material—the most common is a ruby rod—which becomes highly energized. Chromium atoms within the rod create the laser's magic. They gather up energy from wide bands of wavelengths in the white light, concentrate it into a single wavelength of red light, and emit it in the form of an intense, narrow beam so powerful that it has never before been produced by man.

Not only is the energy highly concentrated into a narrow beam of red light, it is also "coherent," that is, the contribution of each emitted light wave from a chromium atom is perfectly timed so that it is exactly "in step" with the waves of light from every other chromium atom and they burst forth in a single pulse from one end of the rod.

Applications of the laser are running the gamut. Predictions are that if harnessed properly, the laser can advance the state-of-the-art in almost every field utilizing optics.

In communications, for example, a single laser beam could carry over 100 million

telephone conversations. In micro-surgery, a laser beam could operate on a single cell; protein molecules, one micron in size, could be picked off the chain with a laser beam. With electronics shrinking into micro-miniaturization, a laser beam could weld the tiniest of components, such as the electrodes of semiconductors where it is important to localize the delivery of heat.

With space requirements so stringent on weight, space, accuracy and reliability, the Manned Spacecraft Center is looking to the laser for possible application to its manned space programs. MSC is particularly interested in the area of deep space communications; distance and position measurement systems (radar) that are lighter, smaller and simpler than microwave, but far more accurate; and stability and guidance systems that could sense minute deviations of a spacecraft attitude in deep space, and could actuate and correct it to a millionth-of-an-inch over a 50 million mile range.

Using ultra-narrow beams, a laser device could penetrate these fantastic distances more accurately than a microwave device, and pound for pound, still emerge the superior piece of equipment from the standpoint of less weight and fewer moving parts.

To clearly define future possibilities, however, early studies need to be narrowed down to a basic comparison of the laser to the microwave. MSC, already thinking ahead, has

initiated a comparison study with Hughes Aircraft Company to determine the feasibility of using an optical communication system (laser) in deep space.

The study, which will outline the design of an ultimate deep space communication system, will investigate three cases: beaming the laser between the spacecraft and the earth; between the spacecraft and an earth-orbiting satellite, then relaying to earth by microwave; and beaming the laser between a spacecraft and a lunar-based laser station, then relaying the signal to earth by microwave.

First report of the study shows an interesting comparison of the two systems utilizing the common denominator of "maximum amount of information transmitted per pound of equipment payload at selected frequencies" or how much information can be transmitted over how much weight it takes to make the transmission. At this point, the laser is winning out in performance and poundage.

The laser is greatly handicapped within the atmosphere by fog, dust, and other visible obstructions. In space, however, where there is no atmosphere to limit its beam, the laser can perform without reservation, and by directing a very narrow beam over great distances the laser offers the "fine tuning" lost in the broad beam of microwave.

A continuous-wave laser system could "carry" a fantastic Several projects have been



**WOODIE L. THOMPSON** of the Instrumentation and Electronic Systems Division's optical communications section displays the "heart" of the laser system, a ruby rod which becomes highly energized when simple white light is pumped into it and emits a single wavelength of red light.

planned by MSC's Instrumentation and Electronics Systems amount of information on its beam, and since present microwave system frequency carriers are limited in the amount of telemetered information they can bring back, the higher laser frequencies look especially promising. The expanded area of higher frequencies available using the laser for transmitting information in many times broader than what is available on microwave.

Division in their laser study program, the first of which is in the form of an experiment aboard a future manned spacecraft. A small, hand-carried voice-modulated gallium arsenide laser transmitter will be pointed to flare on earth by the astronaut in the spacecraft, and, upon command, a 30-second message will be beamed to the flare-marked ground receiver.

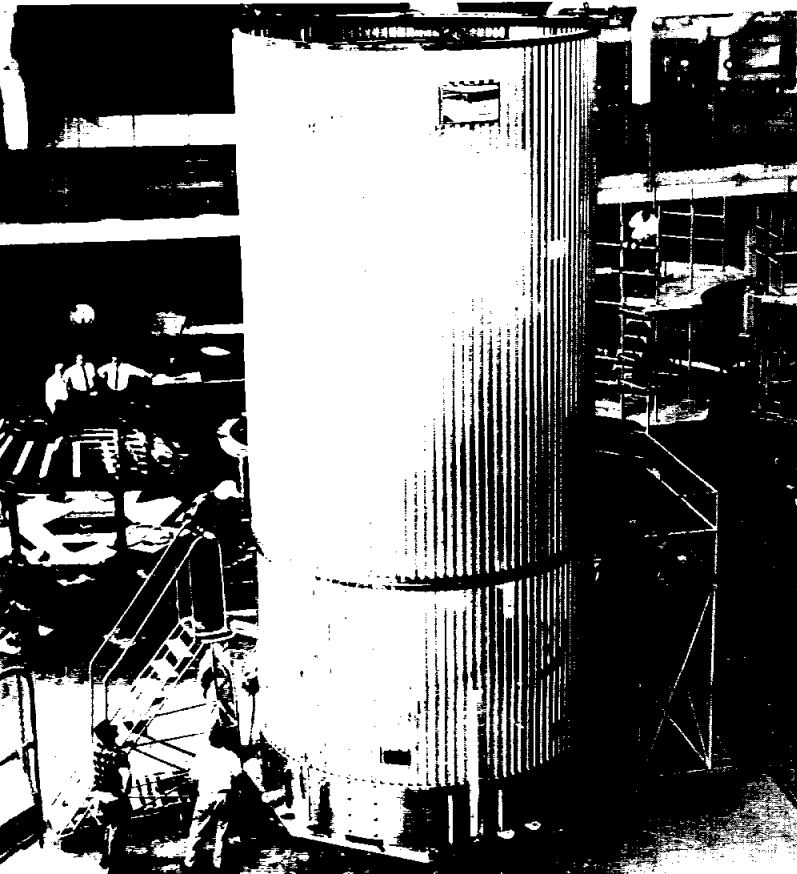
Another project, being conducted jointly by the Lincoln Laboratory and IESD, will study and develop an optical radar with possibility for use in later versions of the lunar excursion module of the Apollo spacecraft. Presumably it could replace a number of microwave systems now proposed for the Apollo mission amounting to a weight-saving of about 100 pounds.

A gas laser of continuous-wave operation to arrive soon at MSC will be used to study the transmission of voice communications. Studies to "receive" voice communications transmitted by a laser may be initiated as a result of the Hughes feasibility study.

In separate laboratory studies a pulsed ruby laser is currently being used in studies on "attenuation" of its beam through rocket exhaust or through similar laboratory high temperature phenomena known as plasmas. Direct application would be to a ranging device, or altimeter aboard a later generation lunar excursion module (LEM) which would beam the laser directly downward through the ion sheath of the LEM's rocket exhaust to "feel" out the lunar surface for a safe descent.

Studies by MSC's Instrumentation and Electronics Division will screen out the plausible from the far-fetched applications of the laser.

## Little Joe II Launch Vehicle Construction Moves Ahead At General Dynamics/Convair



**CORRUGATED ALUMINUM** sections of the forebody and aftbody of Little Joe II, mated for the first time, stand in the General Dynamics/Convair plant in San Diego. Little Joe II will be to Apollo what its predecessor, Little Joe I, was to Mercury.

Activation of a new department (Dept. 311) at General Dynamics/Convair for Little Joe II launch operations at White Sands Missile Range became effective this month.

J. S. Boaz, former chief of material and manufacturing control at Holloman AFB, N. M., assumed the title of site administrator March 11.

Dept. 311 will build up to a peak of 30 engineers and technicians by the first of May.

Initial construction work at the National Aeronautics and Space Administration's former Redstone facility started in January under supervision of the Army Corps of Engineers. Site expansion and new installations will comply with NASA, GD/Convair, and North American Aviation specifications. North American, Apollo spacecraft contractor, will conduct Apollo pad abort tests at the same location while GD/Convair will be firing Little Joe II launch vehicles, designed to launch Apollo spacecraft for in-flight abort tests.

A new 100 x 150-ft. concrete launch pad will be built 1,100

feet from the existing blockhouse, which, with the present gantry tracks, will be retained. New launcher rails for the GD/Convair-built Little Joe II launcher and electrical connections for operation of the launcher will be installed.

First Little Joe II launcher will be assembled in Plant I experimental yard this month for checkout before it is shipped in sections to White Sands by mid-April. There it will be reassembled on site in preparation for first firing this summer.

### Correspondence Class Has Been Taught To 195 MSC Secretaries

Twenty-four MSC secretaries attended a two-day office practices and correspondence course taught by Doris Kresge of Steno Services last week. This brings to 195 the number of MSC secretaries who have taken the course.

It covers office procedure, telephone practices, handling visitors, and the MSC correspondence manual.

# General Dynamics/Astronautics, San Diego, Calif. Bu

Atlas launch vehicles used to orbit the National Aeronautics and Space Administration's Project Mercury astronauts begin as sheets of stainless steel in San Diego, Calif. From stainless steel to completed, flight-ready launch vehicle, the watchwords are quality and reliability.

Achievement of the Atlas quality and reliability necessary for manned flight can be attributed to what probably is the most successful team effort in the history of government-industry relationships.

The Project Mercury program is directed by NASA's Manned Spacecraft Center at Houston, Tex., and the Atlas is built by General Dynamics/Astronautics, San Diego.

The Atlas frequently is described as the most complex operational machine ever invented by man. In spite of this, NASA set the Mercury-Atlas reliability standard so high that

few industry observers believed it could be achieved.

The NASA set out to make it a reality. Together, NASA and General Dynamics/Astronautics instituted the most relentlessly thorough reliability procedures ever applied to a vehicle—which has paid off with what is to date a perfect record in the manned orbital flight program.

At General Dynamics/Astronautics, President J. R. Dempsey himself heads the company's reliability committee. Under NASA's ground rules, the reliability program provides rigid manufacturing, inspection, and test standards for all Mercury-Atlas components, subsystems, and systems.

Atlas space launch vehicles are manufactured in one of the largest and most modern facilities in the free world for research, development, and production of long-range rockets and manned or instru-

mented spacecraft, precision subsystems, and related aerospace equipment.

General Dynamics/Astronautics was created for the development of Atlas. The vehicle is most accurately described as a product of testing—and more testing. Following completion, an Atlas may receive as much as 10 weeks of tests before being delivered to the launch pad. Atlas 109-D, which launched astronaut John Glenn into orbit, received more than 20,000 man-hours of testing after arrival at Cape Canaveral. More than 100 volumes of test reports were compiled during its physical checkup in Florida prior to launch.

Today's Atlas space launch vehicle is a versatile, reliable, flight-proven system that serves NASA in a wide variety of programs in addition to Project Mercury. It is scheduled for more than 100 NASA launches in the 1960s.

Development of the vehicle came through 87 research and development flight tests that proved the soundness and integrity of its design and manufacture. Atlas performance exceeds its original requirements for accuracy, range, and reliability.

The biggest and most powerful space launch vehicle in operational use by NASA today, Atlas towers more than 80 feet high on its launch pad, and is as tall as a seven story building; its engines could provide power to illuminate a city of 30,000. Flight-ready, it weighs more than 100 tons, equivalent to a four-unit diesel locomotive.

The mathematical wizardry of its electronic-computer brain can calculate in milliseconds the data formerly given by panels of instruments to an aircraft pilot, navigator, and flight engineer.

In September, 1959, Atlas flew its first mission for Project Mercury — the successful launch of the experimental "Big Joe" capsule in the first test of a model Mercury spacecraft. Four more unmanned test flights followed "Big Joe." Enos the chimp made a successful flight, and all was announced ready for the first manned orbital launch.

Glenn was orbited successfully by an Atlas launch vehicle on Feb. 20, 1962. Scott Carpenter followed on May 24, with Walter M. Schirra completing his successful flight on Oct. 3, 1962.

Astronaut Gordon Cooper, scheduled to be the nation's first man to orbit the earth for more than 24 hours, will be next to go into space atop an Atlas.

## ASTRONAUTICS

What is today the Astronautics Division of General Dynamics Corporation grew out of Convair, an aircraft manufacturer which became a part of General Dynamics, then spawned three other divisions for production of aircraft and rockets (Ft. Worth, Pomona, and Astronautics divisions). Convair-Astronautics was created in 1957 for production of the Atlas and four years later became a full and separate division of the corporation.

General Dynamics/Astronautics is the largest corporate division, employing approximately 22,000 people, and comprising more than 30 major buildings with a total of more than two million square feet of floor space. The facility covers more than 250 acres nestled against the foothills of the coastal range 10 miles from midtown San Diego.

The division and its prede-

cessor companies entered the space picture early. In 1952, studies began on the satellite capabilities of Atlas. In 1957, after Russia's launching of the first satellite stirred strong U. S. interest in space, the division presented a comprehensive satellite and space development program to government agencies. One recommendation called for development of an upper stage rocket, powered by liquid hydrogen, to be known as Centaur.

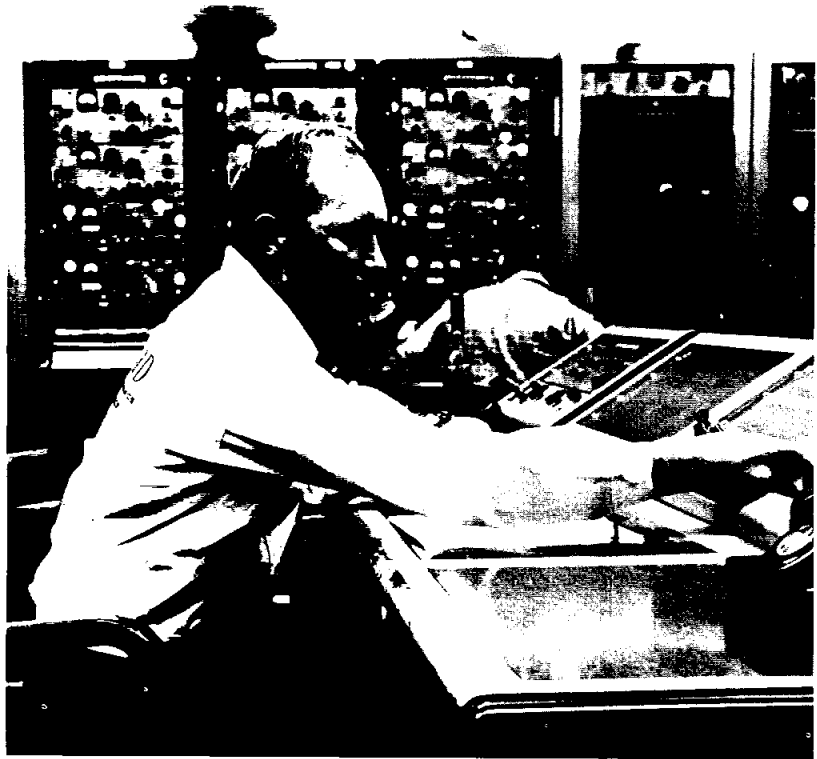


**J. R. Dempsey**  
President, General  
Dynamics/Astronautics

Centaur is a two-stage rocket consisting of a modified Atlas D space booster, topped by a short, high-energy upper stage of Atlas type construction. It will be capable of placing heavy payloads into low earth orbits and of sending large instrumented probes deep into space. Centaur is under the direction of NASA's Lewis Research Center, Cleveland, Ohio.

## 240 CONTRACTS

General Dynamics Astronautics has more than 240 current and recent contracts.



**CALVIN D. FOWLER**, Complex 14 site manager for General Dynamics/Astronautics, San Diego, will launch the Atlas scheduled to boost Astronaut L. Gordon Cooper from Cape Canaveral in May. General Dynamics/Astronautics builds and launches the Atlas space launch vehicle. His predecessor at Complex 14 launch conductor's console was Thomas J. O'Malley, who launched Astronauts Glenn, Carpenter, and Schirra.



**ELECTRONIC COMPONENTS** are assembled in temperature, dust, and humidity-controlled environment at General Dynamics/Astronautics, San Diego. Electronic products include tracking, guidance, range safety, flight control, and space communications systems, airborne programmers, space vehicle-borne data sensing systems, and ground support equipment.



**TEN MILES** from midtown San Diego, nestled against the foothills of the coastal range, is the General Dynamics/Astronautics plant where the Atlas and the Centaur launch vehicles are built. One of the largest and most modern facilities in the free world for research, development, and production of space vehicles and related equipment, General Dynamics/Astronautics comprises 27 major buildings having a total of more than two million square feet of floor space.

# Atlas Launch Vehicle Used In Project Mercury

showing the extreme range and diversity of the capabilities and flexibility required for the conquest of space. Some of the most significant of the contracts are with NASA and range from pure research products to hardware production. For example, they range from theoretical and experimental investigations of low-energy elastic and in-elastic collisions of particles to applied research such as a recently completed test involving three men sealed in a Manned Simulated Space Station for 72 hours.

## AREAS

In the company's Space Science Laboratory, 18 different areas of information are being investigated in depth to broaden the technological base of man-into-space programs. Contracts on six types of vehicles cover the technical area of Atlas alone: the Series D, E, and F Atlases and the SLV 3, SLV 3A, SLV 3B space launch vehicles.

These contracts include development, fabrication, testing, systems integration, spares, technical data processing, technical manuals, updating programs, training, training systems, launch complexes, launch systems, and launch support and services at both the Atlantic and Pacific Missile Ranges.

Other work includes the design and production of scientific passenger pods, in which instruments ride Atlas vehicles into space in experiments unrelated to the primary flight

mission, vehicle tracking systems such as Azusa and Glo-trac including ground stations, test facilities, checkout sets, airborne transponders, and optical beacons, all of which involve specialized electronics capabilities.

Other contracts include: production of autopilot systems attached to rocket exteriors for testing, studies of advanced space vehicles and crew escape techniques, and preliminary design for NASA's manned/unmanned Nova lunar and interplanetary space launch vehicle for the 1970s.

Another important program is the design and development of the Atlas SLV 3B, a standardized launch vehicle capable of a variety of space missions. It is already scheduled for several NASA programs. Standardizing the Atlas space launch vehicle came about to (1) provide greater flexibility in program scheduling, (2) greater reliability, and (3) to eliminate any production and launching problems with a resultant reduction in long-term cost.

## ATLAS AIRFRAME

The SLV 3B will consist of the basic Atlas airframe and engines, with standardized guidance, electrical system, autopilot, tracking, and telemetry kits provided for the particular mission. Launch pads at Cape Canaveral will be modified to meet the new launch vehicle configuration.

The previous system for Atlas space launch vehicles required selection of a specific

booster for its mission at least eight months in advance of the delivery date. Production had to be geared to a particular program and a particular launch pad. With the SLV 3B, required kits can be installed on any of the standard launch vehicles on the production line, as late as 2½ months prior to delivery. With installation of the proper kits, an SLV 3B can be launched from any Atlas space launch pad.

## FUTURE

In addition to several classified projects, Atlas will be the space launch vehicle for the following major payloads and missions in the near future:

Project Ranger, the NASA program for landing instrumented packages on the moon to make scientific measurements.

EGO (Eccentric Geophysical Observatory), a NASA project to place a 1,000-pound general-purpose satellite into a high-altitude earth orbit.

OAO (Orbiting Astronomical Observatory), a NASA program to place an unmanned astronomical observatory in a 550-mile high circular orbit around the earth.

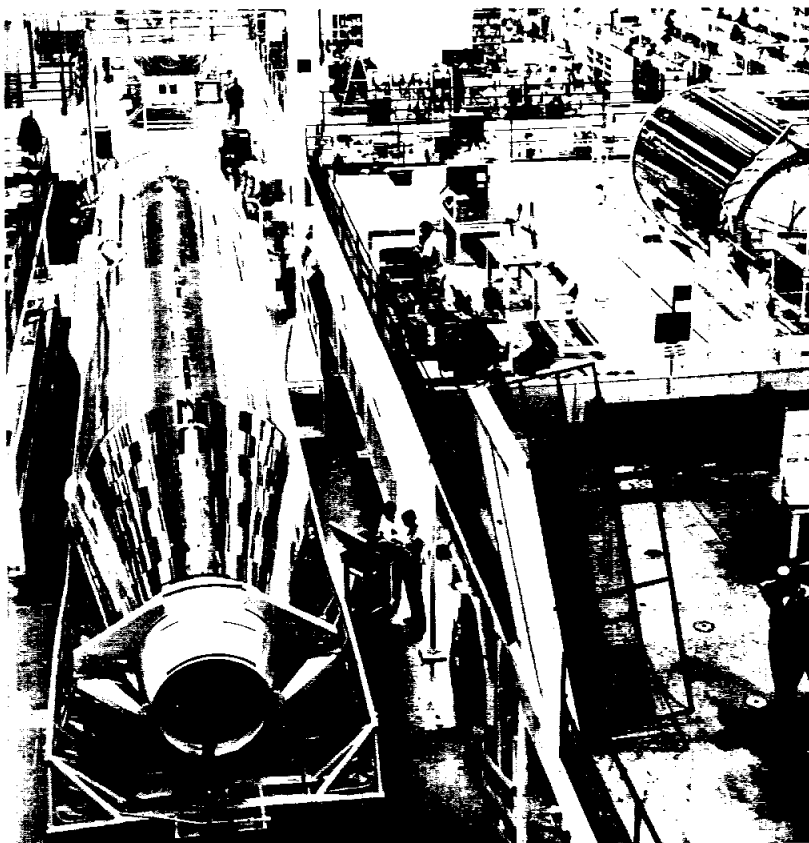
Project Mariner, a NASA program for launching instrumented fly-by probes to Venus and Mars.

Project Fire, a NASA program to test flight articles and systems during re-entry into the atmosphere at moon-to-earth velocity for knowledge on heating, materials response, and radio blackout.

Project Gemini, the NASA project to orbit a two-man spacecraft for development of space rendezvous and docking techniques. Atlas will launch Agena upper stages into orbit to serve as target vehicles for the Gemini spacecraft.



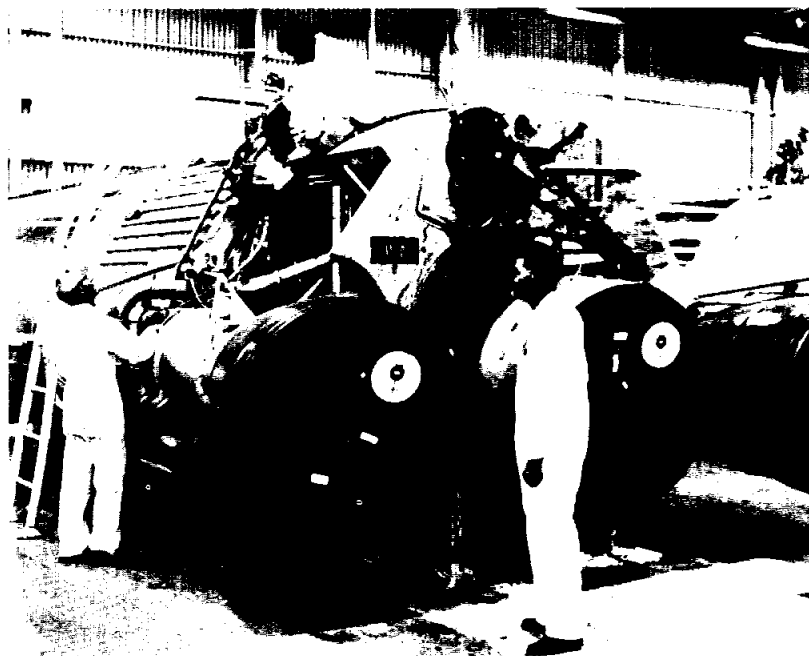
ASTRONAUT GORDON COOPER makes a jocular notation on his Mercury-Atlas during an inspection Feb. 1, at General Dynamics/Astronautics, San Diego. Looking on are Charles S. Ames Jr., General Dynamics/Astronautics vice president and program director for Atlas space launch vehicles, and Calvin Fowler, G D/A launch conductor for Cooper's flight.



BOOSTER WEIGHS IN with its transporting trailer prior to leaving General Dynamics/Astronautics factory. This one placed the first American astronaut into earth orbit for the National Aeronautics and Space Administration's Project Mercury.



A STRIP of cold-rolled type 301 steel is unrolled at General Dynamics/Astronautics, the first step in making the Atlas space launch vehicle used to boost Mercury spacecraft. In this step, the tough, temperature-resistant steel is sized, inspected for scratches, and its thickness checked by micrometer. It then is cut to contour, forming the constant and tapered skins and bulkheads that make up the Atlas "integral" tank. G D/A is prime contractor for the Atlas.



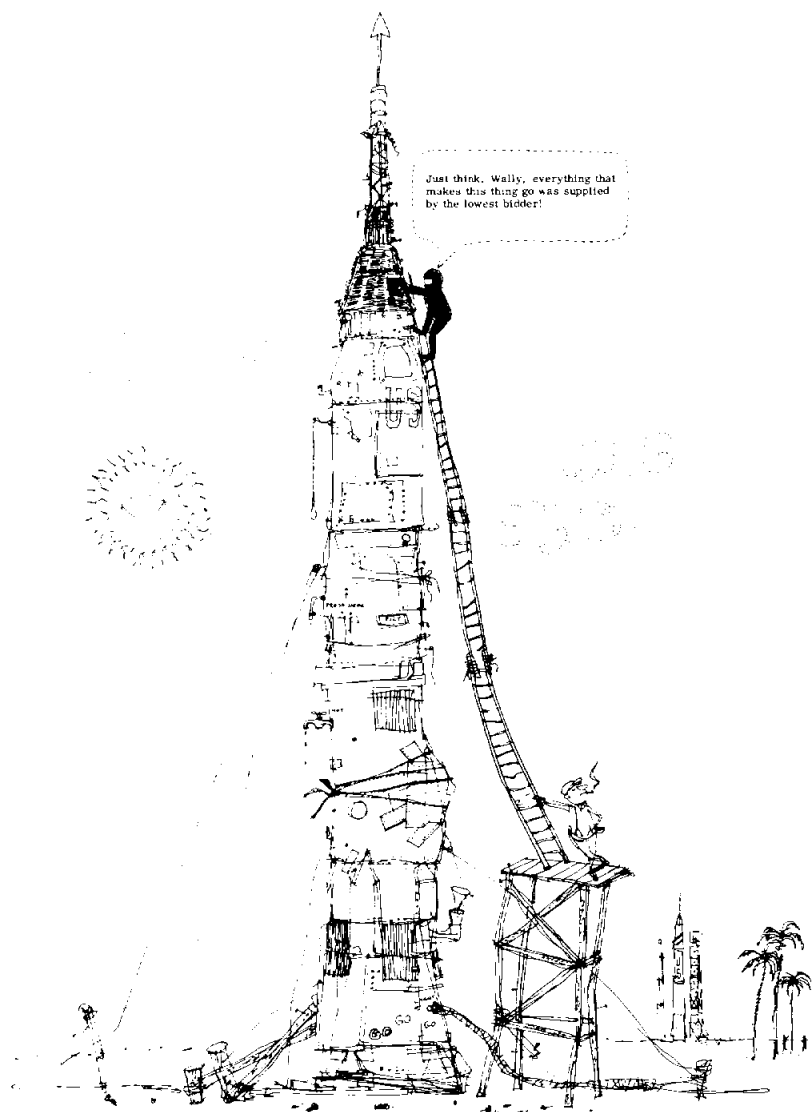
ASTRONAUT WALTER M. SCHIRRA'S Atlas 113-D is prepared for a simulated flight on the assembly dock at General Dynamics/Astronautics. This test involves a countdown and simulation of flight, testing all systems operating together insofar as this is possible with the Atlas vehicle in a horizontal position.



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## On The Lighter Side



Most of the regular MSC visitors to Cape Canaveral have heard (or been caught by) this one, but those who have as yet to visit the Cape should beware of obliging guides who point toward the coastline and remark: "See that striped missile with the bulge around the top? Watch it. Countdown has started and it ought to go pretty quick."

Rumor has it that more than one hapless newcomer has stared at the "striped missile" until his eyes watered, waiting for the Cape lighthouse to belch flame and smoke and go into orbit. It hasn't moved since 1894. But it does have a new role—as the space-age equivalent of a left-handed monkey wrench.

West Virginia's Rep. Ken Hechler, fourth-ranking Democrat on the House Committee on Science and Astronautics, spent the Lincoln's Birthday recess speaking all over his district on the challenge of space exploration. He may have educated some of his constituents too well.

On Feb. 20, the first anniversary of John Glenn's orbital flight, a West Virginia second grade teacher asked her pupils: "Who was the first American to go into orbit?"

Without hesitation, a bright-eyed youngster jumped up and replied: "Ken Hechler!"

—Washington Post

## WELCOME ABOARD

Manned Spacecraft Center acquired 44 new employees between February 17 and March 12, 1963.

*Office of the Director:* Marilyn J. Bockting.

*Gemini Project Office:* Richard E. Lindeman and Neal S. Lavery.

*Apollo Project Office:* Harold A. Bullock.

*Spacecraft Technology Division:* Ralph D. Hodge, Willie S. Beckham, and Marilyn L. Kennedy.

*Crew Systems Division:* William E. Feddersen and Robert O. McBrayer.

*Systems Eval. and Devel. Division:* Patricia H. Marschel, Mario J. Falbo, James R. Briley, and Robert L. Anderson.

*Preflight Operations Division:* Kenneth E. Knell, Verl A. Goldsmith, Charles B. Mars, Melvin Ezell, and Paul Hansen.

*Flight Operations Division:* Roy L. Cox, and Mary S. Burton.

*Flight Crew Operations Division:* Marcus J. Broussard, and Samuel H. Nassiff.

*Computation and Data Reduction Division:* Clayton M. Bergman.

*Instrumentation and Electronic Systems Division:* Helen P. Kohl.

*Personnel Division:* Joyce E. Holt, Dorothy L. Ries, Leona I. Hinson, Raymond H. McKay.

*Financial Management:* Behn C. Taylor.

*Procurement and Contracts Division:* Nancy A. Harrington, and Francis F. Davis.

*Administrative Services:* David C. Spain, and Essie E. Morris.

*Photographic Services:* Preciliano Benavides.

*Technical Services Division:* Arthur R. Booth, Jr., Lawrence W. Petty, James E. Hebert, and Herald E. Whitmer.

*Technical Information:* Charles F. Allyn.

*Logistics Division:* James E. Ward.

*Public Affairs:* Harold L. Hunt.

*Business Mgr. Resident, Bethpage, N. Y.:* Arlene A. Mastro.

*WSMR, White Sands, N. M.:* Edwin J. Burke, and James L. Lashaway.

## Murray Will Attend Texas CU League Meet

Joseph Murray, manager of the MSC Federal Credit Union, will attend the 29th annual meeting of the Texas Credit Union League at the Hotel Texas in Fort Worth Friday and Saturday.

Murray is a director of Members Mutual Insurance Company, a casualty company owned by and operated exclusively for credit union members in four states. Members Mutual is meeting simultaneously with the League and will be observing its eleventh anniversary.

## MSC PERSONALITY

### Charles M. Grant Heads Technical Info. Division

The chief of MSC's Technical Information Division began his career in Government service even before he finished college.

Born August 18, 1915, in Topeka, Kansas, Charles M. Grant, Jr. attended grammar and high schools in Topeka and received his BS in mechanical engineering from the University of Kansas in 1940. Three months before he got his degree in June, Grant went to work for the U. S. Naval Weapons plant in Washington, D. C. as a draftsman.

After receiving his degree, he was made a junior engineer in the Turret Design Branch designing heavy armament for ships. Two years later, in March of 1943, he transferred to the Technical Publications Branch as an engineering writer.

During this period he took a three-year course in technical art and for a time ran the art phase of the branch. The largest single publication put out by the branch at that time was a six-volume series containing more than 1800 illustrations.

By January of 1957, Grant was chief of the branch, which was responsible for such jobs as books on the Tartar launcher, the Talos launcher, and automatic loading and handling of the Terrier launcher; monitoring of the Minuteman program; and establishing ideas for the entire Bureau of Naval Weapons.

In 1954, Grant conceived and started the Society of Federal Artists and Designers, which is still functioning. He was a member of the Bureau of Naval Weapons Documentation Team, composed of experts in the field of specification drawings and quality control. He was the Navy representative on the American Ordnance Association Publishing Committee, which did studies of levels of technical writing. He was a member and later secretary of the East Coast Interlaboratory Committee on Editing and Publishing, made up of key personnel in the field and sponsored by the Senior Science Counsel.

In January of 1962 he joined MSC as chief of the Technical Information Division.

The division has a three-fold mission: to insure quality presentation of technical information developed by the Center in official papers, reports of symposia and conferences, and in private papers presented by its staff to technical and professional societies and journals; to provide for appropriate and rapid distribution of this information throughout NASA, other interested Government agencies, and private industry, with due regard for security classification and proprietary interest; and to serve as an active source for technical and scientific information developed by and of interest to NASA in general and MSC in particular.

In connection with the second named function, the division supports the over-all



Charles M. Grant, Jr.

NASA Industrial Applications program, wherein information on processes and developments suitable for industrial applications is extracted and presentations on their possible uses prepared for dissemination through the Program Office at Headquarters. In connection with the third function, the division maintains and operates a technical library, locating items not immediately available by inter-library loan.

Grant is married to the former Josephine Ball of Virginia and the couple has three children, Patricia Helen, 16 this month; Charles M., 13; and Douglas, 10.

Grant's spare time is devoted "do-it-yourself" carpentry and plumbing. He has also done considerable work with foreign students at the University of Maryland, helping married graduate students from foreign countries find jobs, places to live, furniture, and clothing while earning graduate degrees.

## Toastmistress To Give Fashion Show

A spring fashion show will be presented by the Ellington Toastmistress Club at its regular meeting on Tuesday, April 2. Baxter's of LaPorte, Texas, will provide fashions for the show; and members of the club will serve as models and commentators.

Guests are invited to the dinner meeting and style show, which will be held at the Ellington Air Force Base Officers Club at 5:30 p.m. For further information or reservations, contact Virginia Thompson or Silvie Kelarek, Ext. 5269 or 5270.

Winner of the Club Speech Contest held on March 5 was Cookie Underwood, office of the Resident Auditor, Ellington Air Force Base.

# Philco Gathers Steam For IMCC Contract

Space and electronic experts from four Philco Corporation operations and from Ford Motor Company, Philco's parent Corporation, already are moving to Houston to begin work on NASA's Integrated Mission Control Center, Dr. Walter B. LaBerge, General Operations Program Manager for the Philco project, has announced.

NASA now is negotiating with Philco for a \$30,000,000 contract to build the IMCC at Clear Lake. The center will be used for control of the Gemini rendezvous and Apollo manned mission to the moon.

The initial staff will increase to a peak of about 400 people, 200 of them engineers and scientists, who will design, build, install and check the IMCC, Dr. LaBerge said. When completed the Integrated Mission Control Center will accept communication from sites all over the earth. These sites, in turn, will speak to and track the space capsules in their earth orbits, their rendezvous and lunar flights.

Within the IMCC, the data will be interpreted and stored in computers or directly presented to the flight mission controllers. One portion of the facility will have the capacity to simulate in detail the projected missions and will be used extensively to train astronauts, controllers and remote range operators on the specific characteristics of any mission. Considerable flexibility will be incorporated to permit insertion of possible system errors so that astronauts and ground crews may familiarize themselves with corrective actions.

The display systems to be provided by Philco/Houston for the IMCC are complex but highly reliable projections, presenting both raw and interpreted data from the spacecraft in near real time.

The displays will locate the spacecraft and project the future positions. The system,

## Pay Raise

(Continued from page 1)

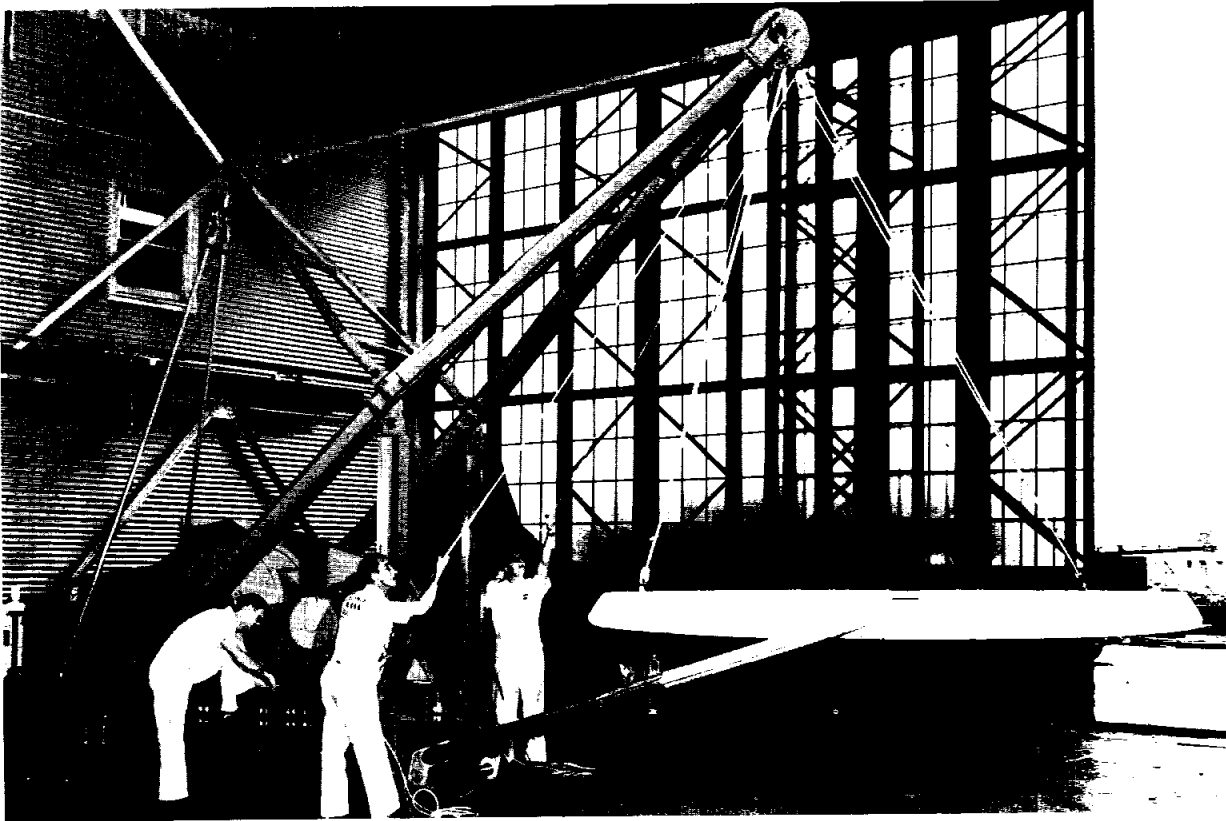
scientists in grades GS-5 through GS-8.

The groups affected included all professional series in the engineering group GS-800-00, including the architecture series GS-808, and science series in such categories as patent adviser and examining, physical sciences, health physics, physics, geophysics (seismology, geomagnetics and earth physics), chemistry, metallurgy, astronomy and space science, meteorology, mathematics, and eight technologies. The latter includes aviation survival equipment, photographic equipment, industrial radiography and packaging and preservation, among others.

The raise set the following minimum salaries for grade GS-5, steps one through five: \$5525, \$5685, \$5845, \$6005, \$6165. The salaries for grade GS-7, steps one through five, are \$6650, \$6835, \$7020, \$7205 and \$7390.

Effective date of the new pay rates is March 3. The pay period beginning on that date closed March 16, and personnel receive checks March 28.

through closed loop television, will have access to a large library of scientific data contained on graphs and charts and tables, and will permit direct conversation over TV with the specialists who will be studying and evaluating the data as the flights progress.



**APOLLO CRANE ASSEMBLY** was being put together at Ellington AFB last week and readied for installation aboard the recently purchased Army LCU now undergoing modification at a New Orleans shipyard. The crane will be mounted at the rear of the boat and used for lifting Apollo boiler-plate mockups from the waters of Galveston Bay after drop tests. The stern of the LCU is being modified to resemble a destroyer's fantail in order to facilitate lifting operations.

## IMCC Bidding

(Continued from page 1)

nate bids, for a 700-ton water chiller and equipment for air conditioning, and an automatic fire detection and alarm system, would also be awarded.

The date for completion of the building is May 30, 1964.

The building will have three stories, including a mission operations wing, an administration wing and a connecting structure. Work in Friday's bidding also included an emergency power building and an extension of the central heating building.

The computer complex in the control center will be built by IBM and the rest of the electronic facilities, including communications center, flight simulation facilities and flight operation displays, will be built by Philco Corp.

## McNamara Visit

(Continued from page 1)

use a larger booster. The two programs are therefore not entirely comparable.

"But because they do have similarities and are both very costly, I believe this trip to Seattle and to Houston, Texas to visit the Manned Spacecraft Center where the Gemini program of NASA is underway, is extremely important.

"We will have spent about

\$350 million on the X-20 by the end of this fiscal year. We are requesting Congress to authorize an additional \$125 million in the next fiscal year (1964).

"The planned 3 hours of briefing by both NASA's Manned Spacecraft Center and Air Force representatives should bring me up to date on the status and progress of the Gemini program and prove valuable for future decision making."

McNamara was accompanied by Secretary of the Air Force Eugene Zuckert; Dr. Harold Brown, director of research and engineering for the Department of Defense; Dr. L. L. Kavanau, special assistant on space to Dr. Brown; Brockway McMillan, assistant secretary for Air Force research and development; Gen. Bernard A. Schriever, chief of the Air Force Systems Command; Brig. Gen. George S. Brown, McNamara's military assistant, NASA Associate Administrator Robert C. Seamans, Sylvester, and Lt. Col. James Knight, military assistant to Zuckert.

The three hour briefing, at which attendance was limited to the visiting party, the speakers and the director and deputy directors of MSC, included discussions of the spacecraft, launch vehicles, network operations and flight control, and crew training for Project Gemini, and was concluded with an Air Force briefing.

The group departed immediately after its conclusion.

The party originally planned a Wednesday night arrival in Houston, and briefings on Gemini Thursday morning before flying to Seattle the same afternoon. Fog and low ceilings in Houston Wednesday night prevented their arrival by air, however, and the schedule was rearranged.

## Glenn Trophy

(Continued from page 1)

missile, rocket and space flight programs."

Lyndon B. Johnson, Vice President of the United States, will be the principal speaker at the National Rocket Club event, which will be held at Washington, D. C.'s Sheraton-Park Hotel on Friday.

Former winners of the Goddard trophy are Dr. Robert R. Gilruth, Director of the Manned Spacecraft Center, who received the trophy in 1962, and Dr. Wernher von Braun, named for the award in 1958.

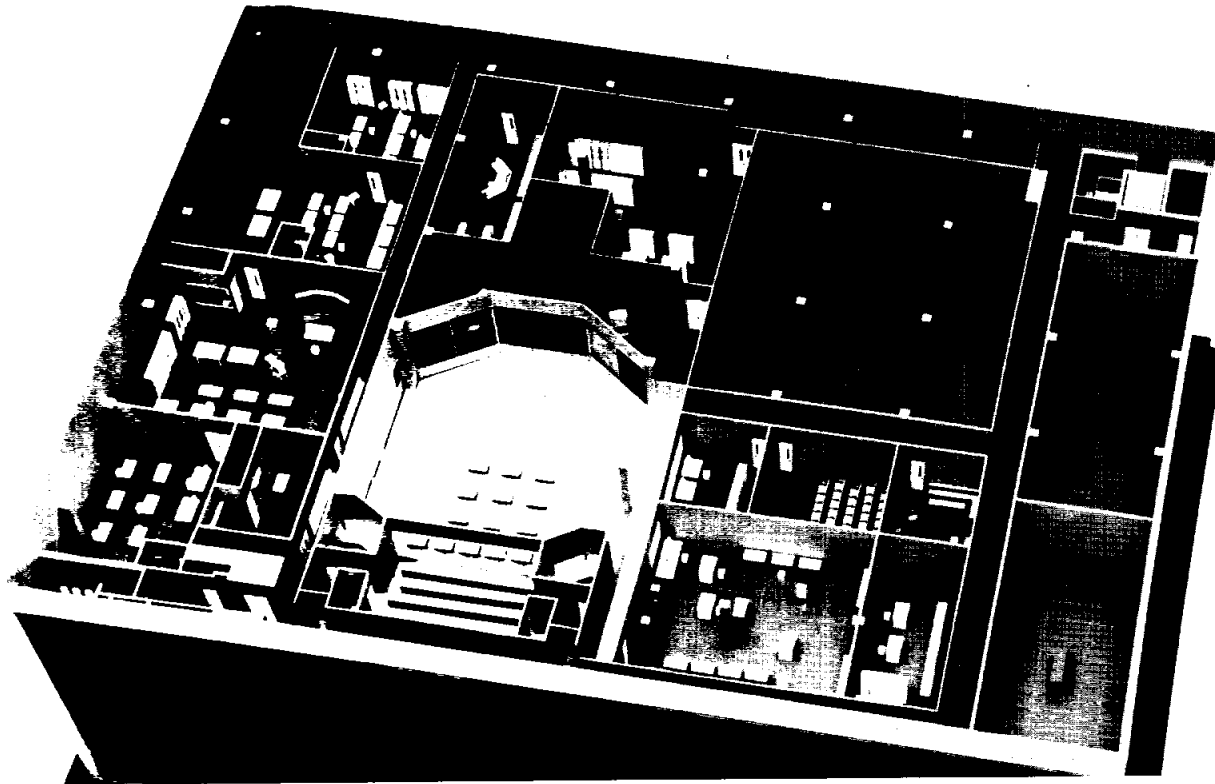
## Computer Course Begins This Week

A computer orientation and programming course will begin March 18 in the conference room at Site 11.

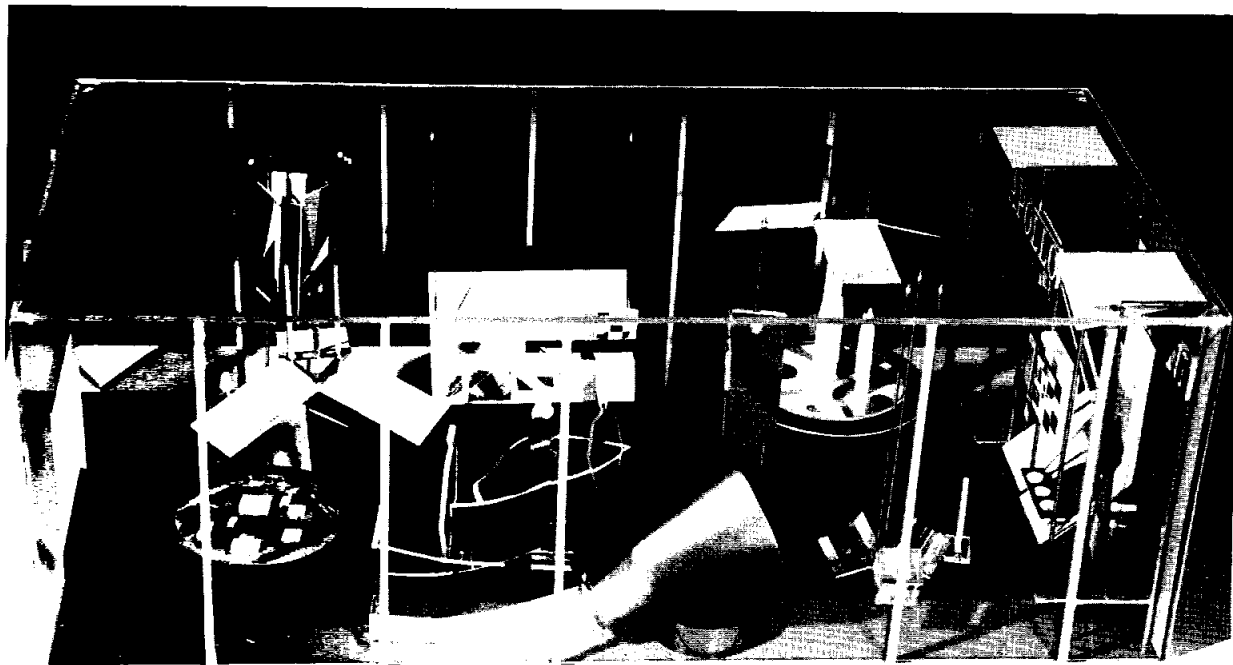
It is divided into two parts, and students may take one or both. Sessions begin at 8:30 a.m. and finish at 11:30 a.m. each weekday morning.

The first part of the course covers one week and will be an introduction to computers and their function. The second part, taught for two weeks, is a more detailed analysis of computer programming.

Instructors will be Jim Raney and Fred Jaap of MSC's Computation and Data Reduction Division.



**AN IDEA OF WHAT** the Integrated Mission Control Center at Clear Lake will look like can be gained from this model recently completed by Philco Corporation, prime contractors for the center from which Gemini and Apollo flights will be controlled. The room in the left center is somewhat reminiscent of Mercury Control Center at Cape Canaveral. Other rooms shown will house computers and related equipment. This is the first story of a 3-story building.



**MSC'S PERMANENT DISPLAY** in the lobby of the World Trade Center in downtown Houston will open April 4. Visible from Texas Street via the floor-to-ceiling glass wall in the foreground, from the steps leading to the building's entrance at left, and from a patio area at rear, the exhibit will be kept up to date as the Mercury, Gemini and Apollo programs progress and change.

## Permanent MSC Exhibit To Open At World Trade Center April 4

A permanent MSC exhibit, open to the public but particularly aimed at technical and educational groups and foreign visitors, and capable of being modified as the concepts of manned space flight change, will be opened April 4 at the World Trade Center, 1520 Texas Avenue.

Planned as one of the most striking space exhibits, the display is being built by Atkins and Merrill, an exhibit con-

tracting firm in Sudbury, Mass. under contract to Manned Spacecraft Center.

It will occupy about 800 square feet on the lobby floor of the World Trade Center building on the corner of Texas and Crawford.

Two sides will open on a patio area and on a clamshell auditorium, which seats 100 and can be used for presentations to educational groups, visiting clubs or delegations. Three sides of the display will be glass-walled from floor to ceiling.

The display is to keep pace with the expanding technology of manned spaceflight and is aimed at education rather than entertainment. There will be a Mercury Spacecraft and a pressure suit, the usual features of manned spaceflight exhibits, but there are quite a few new wrinkles as well.

For instance, there is to be an entrance-and-exit "theme

unit" consisting of a light modulated transparent sphere within a clear plexiglas cube, which constantly changes in a myriad of color and crystal prisms. The geometric symbolism implies certain disciplines of space science.

Above the device and below it, panels containing copy and pictures will welcome the visitor and describe the future of space sciences.

The "diorama," the model of MSC's Clear Lake facility enclosed in a glass dome which was displayed in the lobby of Farnsworth and Chambers Building during the Christmas season, will be included. Panels suspended above it will describe NASA/MSC missions

(Continued on Page 2)

### Supervisors' Class To Begin April 15

A Middle-Manager Development Program for MSC supervisors will be taught by members of the management development staff of the University of Houston and MSC staff members next month, beginning April 15.

The one-week course will involve four hours of classes per day and will cover the functions of management, principles of supervision, qualities of leadership, managerial communications, human relations and the MSC merit promotion plan.

It is designed to provide middle managers with skills and knowledges necessary to perform management responsibilities.

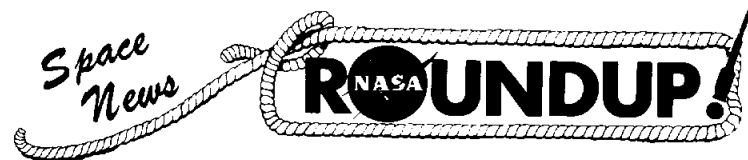
### Engineers Attend Cryogenic Course Being Given Here

Twenty-four MSC engineers and scientists attended a two-week course in cryogenics engineering sponsored by the Training Branch at East End State Bank Building March 4-15.

Instructor for the course was Dr. Richard Kropschott of the National Bureau of Standards, Boulder, Colo. Dr. Kropschott teaches a summer course in cryogenics each year at the University of California in Los Angeles and is considered foremost in his field.

Cryogenics is the science of handling and working with low-temperature liquids and gases, such as liquid oxygen and hydrogen used in booster fuels.

A cryogenics course was taught at Cape Canaveral March 4-8, sponsored jointly by MSC and Launch Operations Center, attended by eight MSC personnel and five LOC personnel. Instructor for the session was Dr. Gordon J. Van Wylen, chairman of the Department of Mechanical Engineering of the University of Michigan.



SECOND FRONT PAGE

## Slow Scan TV Camera May Be Used On MA-9

Lear Siegler, Inc. has delivered to the National Aeronautics and Space Administration slow scan television camera systems and receiving equipment which are intended for use on the forthcoming flight of astronaut Gordon Cooper, according to an announcement yesterday by John G. Brooks, chairman of the board of Lear Siegler, Inc.

Produced by LSI's Electronic Instrumentation Division at Anaheim, California, the equipment may be employed to transmit the first TV photos of an American space flight. The MA-9 launching is scheduled for mid-May.

A rugged eight pound camera, similar to the one that transmitted the spectacular photos of the Echo Balloon in 1962, may be installed in the MA-9 spacecraft, Brooks stated. The camera would normally be focused on the astronaut but could hand held and focused on other objects or to pick up the view outside the spacecraft.

The ground support equipment, which will be installed at Cape Canaveral and two other locations, will receive the slow scan TV pictures. The camera will operate one picture every two seconds which will be transmitted to the ground station over an RF communications link. The camera and ground support equipment were produced under contracts awarded to LSI by NASA.

All MSC personnel within any MSC facility should conspicuously wear the authorized identification badge and have their MSC identification card in their possession.

### Apollo Test Craft Arrives At MSC; Goes To Marshall

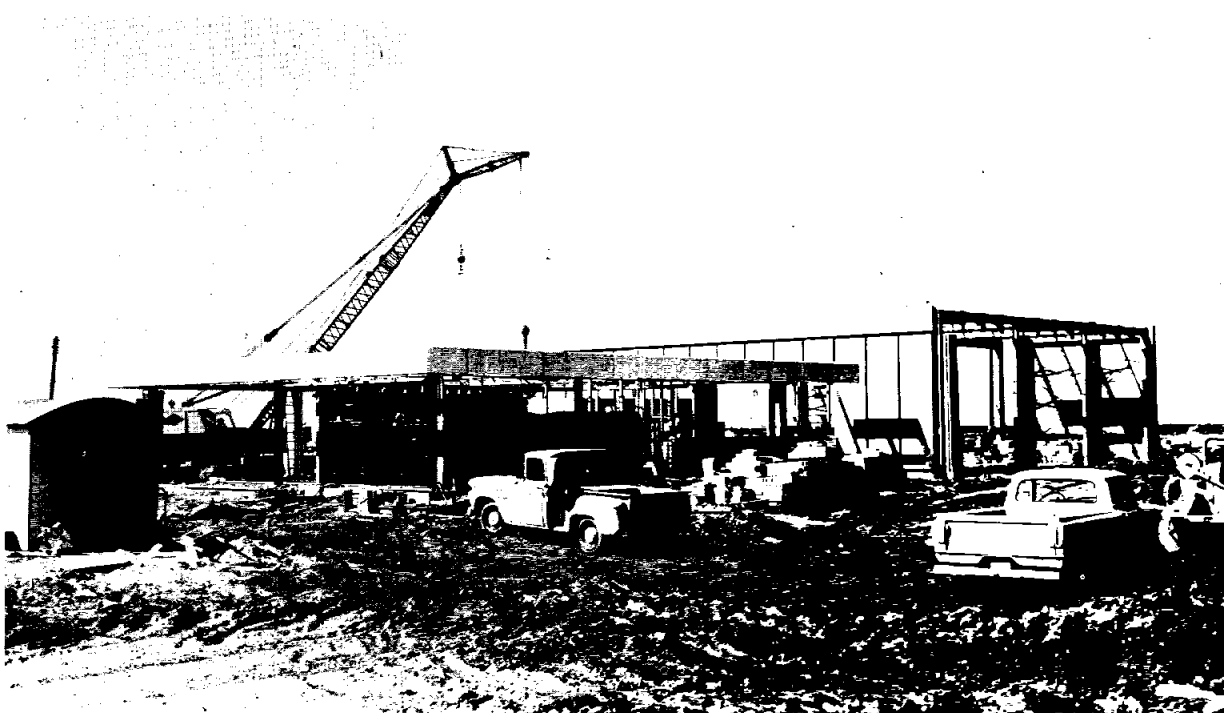
The first flight-rated Apollo spacecraft test vehicle was delivered to the National Aeronautics and Space Administration March 12 for "electrical shaker" tests atop a two-stage Saturn I launch vehicle.

The spacecraft, a 55-foot-tall boilerplate replica of the Apollo external configuration, includes the command and service modules and the launch escape tower.

The hardware was delivered on schedule to representatives of NASA's Manned Spacecraft Center at Downey by North American Aviation's Space and Information Systems Division, principal contractor for the Apollo command and service modules.

It came to MSC Tuesday for various tests and a brief press showing, and will be shipped on to Marshall Space Flight Center, Huntsville, Ala., to be mated atop the Saturn launch vehicle for dynamic and vibration tests.

Purpose of the tests is to determine the dynamic compatibility of the spacecraft and Saturn launch vehicle. A similar configuration will be flown into earth orbit at a later date.



**CONSTRUCTION** of facilities at the Clear Lake site has reached the stage of visible progress now. The fire station above, first building to receive exterior finish, shows the dominant architectural finish typical of 19 permanent buildings presently in various stages of construction. Still to be erected are glass and aluminum walls for the office and living quarters of the fire station. Structural steel is being erected for the central data office, and central heating and cooling plant. Steel will start going up on the project management building, support shops and warehouse before the end of this month, according to the Facilities Division.